Appl. No. 10/686,551
Amdt. dated November 15, 2005
Response to Supplemental Notice of Allowability dated
October 24, 2005

PATENT

REMARKS/ARGUMENTS

Applicants note with appreciation that claims 16-81 have been allowed.

Additionally, Applicants would like to thank the Examiner for interview conducted on October 20, 2005. During the interview, Applicants' attorney authorized the Examiner to amend claims 78-81. Specifically, Applicants' attorney authorized the Examiner to amend claim 81 by replacing the word "the" with the phrase "a storage medium comprising a representation of an", and claim 81 after the amendment should read as follows:

81.   ~~The~~A storage medium comprising a representation of an image formed by the system for rendering an object of claim 57.

In contrast, on the Examiner's Amendment mailed October 24, 2005, the Examiner stated the following:

"Claim 78 (Currently Amended) <u>A storage medium comprising a representation of an image</u> formed by the system for rendering an object of claim 57."

The Examiner appears to have made a typographical error. For the above mentioned claim amendment, the Examiner appears to have intended to amend claim 81 instead of claim 78.

Therefore, Applicants respectfully request that <u>an amendment for claim 81 be entered</u> as follows:

81.   ~~The~~A storage medium comprising a representation of an image formed by the system for rendering an object of claim 57.

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CONCLUSION

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 650-326-2400.

Respectfully submitted,

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	Confirmation No. 3476
LOKOVIC et al.	Examiner: Kimbinh T. Nguyen
Application No.: 10/686,551	Technology Center/Art Unit: 2671
Filed: October 14, 2003	COMMUNICATION: - COMMENTS ON STATEMENT OF REASONS FOR ALLOWANCE
For: METHOD AND APPARATUS FOR RENDERING SHADOWS	
Customer No.: 20350	

Mail Stop Issue Fee
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Examiner's Statement of Reasons for Allowance, Applicants note that claim 16 recites:

16.   A method for generating a shadow map, the method comprising:

receiving information associated with a first light source;

generating at least a first ray and a second ray from the first light source;

determining a first ray transmittance function associated with the first ray;

determining a second ray transmittance function associated with the second ray;

processing information associated with the first ray transmittance function and the second ray transmittance function;

determining a first visibility function based on at least information associated with the first ray transmittance function and the second ray transmittance function;

wherein the determining a first ray transmittance function includes:

processing information associated with the first ray;

determining at least a first surface transmittance function based on at least information associated with the first ray;

determining at least a first volume transmittance function based on at least information associated with the first ray;

processing information associated with the first surface transmittance function and the first volume transmittance function;

determining the first ray transmittance function based on at least information associated with the first surface transmittance function and the first volume transmittance function.

Applicants also note that claim 28 recites:

28.   A method for generating a shadow map, the method comprising:

receiving information associated with a first light source;

generating at least a first ray and a second ray from the first light source;

determining a first ray transmittance function associated with the first ray;

determining a second ray transmittance function associated with the second ray;

processing information associated with the first ray transmittance function and the second ray transmittance function;

determining a first visibility function based on at least information associated with the first ray transmittance function and the second ray transmittance function;

wherein the determining a first ray transmittance function includes:

determining a first geometric element intersecting the first ray;

processing information associated with the first geometric element;

determining a first geometric transmittance function based on at least information associated with the first geometric element;

processing information associated with first geometric transmittance function;

determining the first ray transmittance function based on at least information associated with first geometric transmittance function.

Applicants also note that claim 31 recites:

31.   A method for generating a shadow map, the method comprising:
receiving information associated with a first light source;
generating at least a first ray and a second ray from the first light source;
determining a first ray transmittance function associated with the first ray;
determining a second ray transmittance function associated with the second ray;
processing information associated with the first ray transmittance function and the second ray transmittance function;

determining a first visibility function based on at least information associated with the first ray transmittance function and the second ray transmittance function;

wherein the first visibility function is capable of being equal to any value smaller than or equal to a first value and larger than or equal to a second value, the first value associated with being fully lit by the first light source, and the second value associated with being completely unlit by the first light source.

Applicants also note that claim 44 recites:

44.   A method for rendering an object, the method comprising:
receiving information associated with a first shadow map related to a first light source, the first shadow map including a first visibility function with respect to a first three-dimensional coordinate system;
receiving information associated with a first surface;

determining a first location associated with the first surface with respect to the first three-dimensional coordinate system;

processing information associated with the first location and the first shadow map;

determining a first visibility value associated with the first location based on at least information associated with the first shadow map and the first location;

wherein the first visibility value is capable of being equal to any value smaller than or equal to a first value and larger than or equal to a second value, the first value being associated with being fully lit by the first light source, and second value being associated with being completely unlit by the first light source.

Applicants also note that claim 46 recites:

46.   A method for rendering an object, the method comprising:

receiving information associated with a first shadow map related to a first light source, the first shadow map including a first visibility function with respect to a first three-dimensional coordinate system;

receiving information associated with a first surface;

determining a first location associated with the first surface with respect to the first three-dimensional coordinate system;

processing information associated with the first location and the first shadow map;

determining a first visibility value associated with the first location based on at least information associated with the first shadow map and the first location;

wherein the first visibility value is associated with at least a first geometric transmittance function.

Applicants also note that claim 48 recites:

48.   A computer program product including a computer-readable medium including instructions for generating a shadow map, the computer-readable medium comprising:

one or more instructions for receiving information associated with a first light source;

one or more instructions for generating at least a first ray and a second ray from the first light source;

one or more instructions for determining a first ray transmittance function associated with the first ray;

one or more instructions for determining a second ray transmittance function associated with the second ray;

one or more instructions for processing information associated with the first ray transmittance function and the second ray transmittance function;

one or more instructions for determining a first visibility function based on at least information associated with the first ray transmittance function and the second ray transmittance function;

wherein the one or more instructions for determining a first ray transmittance function includes:

one or more instructions for processing information associated with the first ray;

one or more instructions for determining at least a first surface transmittance function based on at least information associated with the first ray;

one or more instructions for determining at least a first volume transmittance function based on at least information associated with the first ray;

one or more instructions for processing information associated with the first surface transmittance function and the first volume transmittance function;

one or more instructions for determining the first ray transmittance function based on at least information associated with the first surface transmittance function and the first volume transmittance function.

Applicants also note that claim 49 recites:

49.   A computer program product including a computer-readable medium including instructions for generating a shadow map, the computer-readable medium comprising:

one or more instructions for receiving information associated with a first light source;

one or more instructions for generating at least a first ray and a second ray from the first light source;

one or more instructions for determining a first ray transmittance function associated with the first ray;

one or more instructions for determining a second ray transmittance function associated with the second ray;

one or more instructions for processing information associated with the first ray transmittance function and the second ray transmittance function;

one or more instructions for determining a first visibility function based on at least information associated with the first ray transmittance function and the second ray transmittance function;

wherein the one or more instructions for determining a first ray transmittance function includes:

one or more instructions for determining a first geometric element intersecting the first ray;

one or more instructions for processing information associated with the first geometric element;

one or more instructions for determining a first geometric transmittance function based on at least information associated with the first geometric element;

one or more instructions for processing information associated with first geometric transmittance function;

one or more instructions for determining the first ray transmittance function based on at least information associated with first geometric transmittance function.

Applicants also note that claim 50 recites:

50.   A computer program product including a computer-readable medium including instructions for generating a shadow map, the computer-readable medium comprising:

one or more instructions for receiving information associated with a first light source;

one or more instructions for generating at least a first ray and a second ray from the first light source;

one or more instructions for determining a first ray transmittance function associated with the first ray;

one or more instructions for determining a second ray transmittance function associated with the second ray;

one or more instructions for processing information associated with the first ray transmittance function and the second ray transmittance function;

one or more instructions for determining a first visibility function based on at least information associated with the first ray transmittance function and the second ray transmittance function;

wherein the first visibility function is capable of being equal to any value smaller than or equal to a first value and larger than or equal to a second value, the first value associated with being fully lit by the first light source, and the second value associated with being completely unlit by the first light source.

Applicants also note that claim 51 recites:

51.   A computer program product including a computer-readable medium including instructions for rendering an object, the computer-readable medium comprising:

one or more instructions for receiving information associated with a first shadow map related to a first light source, the first shadow map including a first visibility function with respect to a first three-dimensional coordinate system;

one or more instructions for receiving information associated with a first surface;

one or more instructions for determining a first location associated with the first surface with respect to the first three-dimensional coordinate system;

one or more instructions for processing information associated with the first location and the first shadow map;

one or more instructions for determining a first visibility value associated with the first location based on at least information associated with the first shadow map and the first location;

wherein the first visibility value is capable of being equal to any value smaller than or equal to a first value and larger than or equal to a second value, the first value being associated with being fully lit by the first light source, and second value being associated with being completely unlit by the first light source.

Applicants also note that claim 52 recites:

52.   A computer program product including a computer-readable medium including instructions for rendering an object, the computer-readable medium comprising:

one or more instructions for receiving information associated with a first shadow map related to a first light source, the first shadow map including a first visibility function with respect to a first three-dimensional coordinate system;

one or more instructions for receiving information associated with a first surface;

one or more instructions for determining a first location associated with the first surface with respect to the first three-dimensional coordinate system;

one or more instructions for processing information associated with the first location and the first shadow map;

one or more instructions for determining a first visibility value associated with the first location based on at least information associated with the first shadow map and the first location;

wherein the first visibility value is associated with at least a first geometric transmittance function.

Applicants also note that claim 53 recites:

53.   A system for generating a shadow map, the system comprising:
a processing system configured to:

receive information associated with a first light source;

generate at least a first ray and a second ray from the first light source;

determine a first ray transmittance function associated with the first ray;

determine a second ray transmittance function associated with the second ray;

process information associated with the first ray transmittance function and the second ray transmittance function;

determine a first visibility function based on at least information associated with the first ray transmittance function and the second ray transmittance function;

wherein the determine a first ray transmittance function includes:

process information associated with the first ray;

determine at least a first surface transmittance function based on at least information associated with the first ray;

determine at least a first volume transmittance function based on at least information associated with the first ray;

process information associated with the first surface transmittance function and the first volume transmittance function;

determine the first ray transmittance function based on at least information associated with the first surface transmittance function and the first volume transmittance function.

Applicants also note that claim 54 recites:

54.   A system for generating a shadow map, the system comprising:
a processing system configured to:

receive information associated with a first light source;

generate at least a first ray and a second ray from the first light source;

determine a first ray transmittance function associated with the first ray;

determine a second ray transmittance function associated with the second

ray;

process information associated with the first ray transmittance function
and the second ray transmittance function;

determine a first visibility function based on at least information
associated with the first ray transmittance function and the second ray transmittance
function;

wherein the determine a first ray transmittance function includes:

determine a first geometric element intersecting the first ray;

process information associated with the first geometric element;

determine a first geometric transmittance function based on at least
information associated with the first geometric element;

process information associated with first geometric transmittance
function;

determine the first ray transmittance function based on at least
information associated with first geo metric transmittance function.

Applicants also note that claim 55 recites:

55.   A system for generating a shadow map, the system comprising:
a processing system configured to:

receive information associated with a first light source;

generate at least a first ray and a second ray from the first light source;

determine a first ray transmittance function associated with the first ray;

determine a second ray transmittance function associated with the second ray;

process information associated with the first ray transmittance function and the second ray transmittance function;

determine a first visibility function based on at least information associated with the first ray transmittance function and the second ray transmittance function;

wherein the first visibility function is capable of being equal to any value smaller than or equal to a first value and larger than or equal to a second value, the first value associated with being fully lit by the first light source, and the second value associated with being completely unlit by the first light source.

Applicants also note that claim 56 recites:

56. A system for rendering an object, the system comprising:

a processing system configured to:

receive information associated with a first shadow map related to a first light source, the first shadow map including a first visibility function with respect to a first three-dimensional coordinate system;

receive information associated with a first surface;

determine a first location associated with the first surface with respect to the first three-dimensional coordinate system;

process information associated with the first location and the first shadow map;

determine a first visibility value associated with the first location based on at least information associated with the first shadow map and the first location;

wherein the first visibility value is capable of being equal to any value smaller than or equal to a first value and larger than or equal to a second value, the first

value being associated with being fully lit by the first light source, and second value being associated with being completely unlit by the first light source.

Applicants also note that claim 57 recites:

57.   A system for rendering an object, the system comprising:

a processing system configured to:

receive information associated with a first shadow map related to a first light source, the first shadow map including a first visibility function with respect to a first three-dimensional coordinate system;

receive information associated with a first surface;

determine a first location associated with the first surface with respect to the first three-dimensional coordinate system;

process information associated with the first location and the first shadow map;   determine a first visibility value associated with the first location based on at least information associated with the first shadow map and the first location;

wherein the first visibility value is associated with at least a first geometric transmittance function.

None of the prior art references teach or suggest a method, a computer program product, or a system as recited in any of these claims.

Respectfully submitted,

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